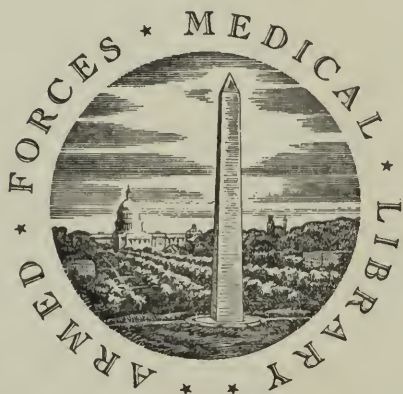


UNITED STATES OF AMERICA



FOUNDED 1836

WASHINGTON, D.C.

A
DISSERTATION
ON THE
GENERAL PRINCIPLES OF ANATOMY
AND
COMPARATIVE PHYSIOLOGY,
AS APPLIED TO THE
SCIENCE OF MEDICINE.



BY JULIUS RUCCO, M. D.

Late Professor of Anatomy and Comparative Physiology in the Medical College of Naples: Member of many Medical and Literary Societies in Europe, and the United States of America: Author of several Medical Works, &c. &c.

*Nos naturam sequamur, et ab omni quod abhorret ab ipsa, oculorum auriumque
comprobatione fugiamus.* CICERO.

TRANSLATED FOR THE AUTHOR BY THOMAS WILSON.

PHILADELPHIA:

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1818.

EASTERN DISTRICT OF PENNSYLVANIA, to-wit:

{ L S } BE IT REMEMBERED, That on the fourth day of May,
in the forty second year of the Independence of the United
States of America, A. D. 1818

JULIUS RUCCO, M. D.

of the said District, hath deposited in this office the Title of a Book the right whereof he claims as Author in the words following, to wit:

" *A DISSERTATION on the general principles of ANATOMY and COMPARATIVE PHYSIOLOGY, as applied to the Science of Medicine By JULIUS RUCCO, M. D. late Professor of Anatomy and Comparative Physiology in the Medical College of Naples: Member of many Medical and Literary Societies in Europe, and the United States of America: Author of several Medical works &c &c* "

Nos naturam sequamur, et ab omni quod abhorret ab ipsa, oculorum auriumque comprobatione fugiamus. *Cicero*

Translated for the Author by THOMAS WILSON

In Conformity to the Act of the Congress of the United States, intituled, "An Act for the Encouragement of Learning, by securing the Copies of Maps, Charts, and Books, to the Authors and Proprietors of such Copies, during the Times therein mentioned" — And also to the Act, entitled, "An Act supplementary to an Act, entitled, "An Act for the Encouragement of Learning, by securing the Copies of Maps, Charts, and Books to the Authors and Proprietors of such Copies during the Times therein mentioned," and extending the Benefits thereof to the Arts of designing, engraving, and etching historical and other Prints."

D. CALDWELL,
Clerk of the District of Pennsylvania.

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On the other hand, I do not flatter myself to be competent to the arduous undertaking of improving, to any great degree, Comparative Anatomy; as, candor explicitly requires the avowal, that Cuvier, Scarpa, Vieq. d'Azyr, Poli. Camper. and many others, whose names merit immortality, have nearly brought it to perfection.

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D. CALDWELL.
Clerk of the District of Pennsylvania

Dr RUCCO

To Dr. N. CHAPMAN, Professor of the Theory and Practice of Medicine in the University of Pennsylvania, &c. &c.

ESTEEMED SIR,

To the object of offering to a gentleman far advanced as you are in the Science of Man, this Essay containing the general ideas of my work upon *ANATOMY* and *COMPARATIVE PHYSIOLOGY* applied to the several branches of the medical art, I have, moreover, added the idea, of stating to the Public the motives which induced me to compose a work intrinsically important and equally difficult.

In the first place, I have thought, that, since the means which Human Anatomy presents for obtaining a knowledge of the secret organization of man have been, and still are, inadequate; since this knowledge has baffled, to the present day, the efforts and attempts of the most distinguished anatomists, it would be useless to pursue the same path of enquiry, since we may have access to the means which Nature presents us with, in studying the organization of animals; when we are suffered, at least, to discover the first outlines of their organs; to follow, step by step, their gradual composition, and to arrive, at last, by this mode, at the knowledge of their improvement, which is completely in affiliation to the object which occupies our attention.

How much, therefore, the correct knowledge of the organic tissue of man may influence the advancement of the *HEALING ART*, I submit to your mature judgment, and to the consideration of your colleagues who walk with dignity in the paths of Philosophy.

On the other hand, I do not flatter myself to be competent to the arduous undertaking of improving, to any great degree, Comparative Anatomy; as, candor explicitly requires the avowal, that Cuvier, Scarpa, Vieq. d'Azgr. Poli. Camper. and many others, whose names merit immortality, have nearly brought it to perfection.

To enlarge the Sphere of Comparative Physiology, the outlines of which are to be found only in the ingenious and erudite work of Professor Jacopi, (whose premature death deprived the Science which he assiduously cultivated of a valuable member), and to apply, at once, Anatomy and Comparative Physiology to the improvement of the Medical Art has been my principal aim.

Following the Laws and Order of Nature....critically examining all the late discoveries in Medicine, and joining the results of my inquiries, I have used every exertion to render the work useful and acceptable; and, in short, I flatter myself that the proposed objects have been nearly accomplished.

Whether I have succeeded in my undertaking, the learned Physicians of the United States must decide. Their impartial criticism I shall respect. I have, in this publication, consulted my own zeal and attachment to science, and confidently expect that the object to which I aspire will be eventually attained.*

*Accept, Sir, the tender of my esteem, consideration and
friendship,*

J. R.

* The manuscript of this work is ready. It will be comprised in three volumes 8vo. of five hundred pages each. The first treats upon the vital organs and of the functions to which they are designed: the second, of the auxiliary organs and functions: and the last, of the organs and functions destined to the propagation of the human race.

COMPARATIVE ANATOMY.

This useful Science is the offspring of necessity. Alchameon, Democritus, Aristotle, and other celebrated philosophers of antiquity living in an age when even to approach a human body after death was most rigidly prohibited, were led, by necessity, to the dissection of animals. Hence arose Comparative Anatomy, which, with the assistance of the discoveries of Spallanzani, was subsequently established on a solid basis by Mertrud, Doubenton, Scarpa, Poli, Camper, Vicq d'Azyr, Reaumur, Buffon, Laclepède, Olivier, Bose, Geoffroy, Lamarck, and to which the genius and labors of Professor Cuvier have given a new splendor at the present day.

Comparative Anatomy is calculated, in an eminent degree, to lead us to a more intimate knowledge of the organization of man. It has already shed a strong light upon this interesting, though intricate subject; and there can be no doubt, that human physiology and pathology will progress towards perfection, in proportion as our knowledge of the organization of the human body is more perfectly understood*.

* It is by the aid of this science that Scarpa, Moscati, Tommasini, Mascagni, Targioni, Rubini, Rasori, Palloni, Jacopi, Nannoni, Desault, Bichat, Pinel, Darwin, Gall, Richerand and many others have contributed so much to the improvement of medical science and brought it to that elevated standing which it holds at the present day. To be convinced of this, we need but take a short view of the classical works which these eminent physicians and philosophers have given to the world.

The study of Comparative Anatomy points out to us, in a striking manner, the variations, gradations, analogies, and differences of the organs of certain inferior animals. These circumstances appear to us the more glaring, when we compare the organs of animals with those of the same kind in man. This, indeed, is the legitimate object of Comparative Anatomy.

This Science presents us with the various modifications to which the organs of different animals are subject ; and thus, by furnishing us with instructive facts and analogies, we may be enabled to arrive at truth, and finally perfect our acquaintance with the organization of man, which is the ultimate aim of our researches.

It will, therefore, be interesting to sketch, in a rapid manner, the wonderful phenomena of organized nature: viz. the organization of the polypi, radiarii, worms, insects, arachnoides, crustaceæ, moluscae, fish, reptiles, birds and mammiferæ, in which nature has brought, as it were to a centre, the most curious phenomena and the most instructive facts, to which we may recur when we desire to examine and to be made acquainted with the organization of man.

In pursuing, step by step, the gradual composition and development of the organs of different animals, commencing from the most simple, the polypus, and proceeding up to man, we may remark,

in the first place, the most simple sketch of animated nature ; then, the first delineations of the nervous and muscular fibres ; and, lastly, the primitive state of their organs, and the order which nature observes in their gradual composition. It is by investigation, pursued in this way, that we are enabled to study the primordial texture and development of the organs of man, which, as we shall see, have a close relation to those of other animals.

In the *Infusoires*, or microscopic animals, we perceive the most simple form of animated nature ; or rather, the unity of animal organization ; inasmuch as these are wholly gelatinous and transparent, though they are with propriety ranked in the class of animals. These animals do not possess any special organ, not even that of digestion. They imbibe or absorb the food designed for their nourishment by the pores which are found on the surface of their bodies. It would, indeed, be absurd to believe, as professor Lamarck has very justly observed, that microscopic animals could possess all the organs which are known to exist in the more perfect animals, and which in the former seem to be, as it were, amalgamated in the general mass of their bodies.

In fact, the organs of more perfect animals would be wholly useless to the *infusoires*, even though they could be compatible with the simplicity of their organization.

In the Polypi we next perceive the first trace of the stomach, or rather what answers that purpose, a blind intestinal canal, the entry of which performs the functions of the mouth and anus.

The Radiarii are, in the third place, those animals which present us with the first vestiges of nervous and motive fibres, the inceptive state of the ovaries and the outlines of the organs designed for respiration.

In Worms we perceive, in miniature, the longitudinal marrow, and the articulations. I speak of the semi-circular rings, which, in a manner, supply the want of proper articulations, since they perform, in some measure, the functions of these. It is also of importance to observe, that, in this class of animal nature, the nervous and muscular fibres have acquired a considerable degree of consistence. The stomach itself, in worms, has made some progress towards perfection ; since, in these, it has two apertures. the one for the reception of food, and the other for the discharge of the fæces.

Proceeding, in our enquiries, to animals more and more compound, we find, for instance, in insects, which form the next link after worms, in the chain of organization, the articulations a little more marked, and the rudiments of jaws and eyes. In the Crustaces, we find the outlines of the heart, and the brain perhaps for the exercise of intellectual functions.

Nature, after having thus formed the organs of animals without vertebræ, constantly proceeding from the more simple to the more compound, has passed on to circumscribe and render them more voluminous, solid and consistent, such as we observe in animals with vertebræ, with which fish, reptiles, birds and mammiferæ are all furnished.

Here it is important to observe, that in studying, after this method, the first germ of animal organization ; in remarking the primitive state of the nervous and muscular fibres, and, in pursuing step by step the progress which the organs of different animals make, from the polypus to the mammiferæ, to which we should refer man, notwithstanding his pride and lofty dignity, is to examine the texture of the organs of man ; because the organs of animals approximate those of man by their chemical, anatomical and physiological relations.

They approximate them by chemical relations, because the elementary or component particles of the organs of animals do not vary from those which enter into the composition of the human organs. The respective proportions of these elementary parts, in the similar organs of different animals, are considerations of a secondary nature, and have no influence on the order of things which tend to the same object.

They approximate them by anatomical relations, because the nervous, the motive and cellular fibres, which constitute the three physical elements of the first order of the organs of animals and of man, possess nearly the same character, and their form and different consistence is merely a slight modification, to which we should rather ascribe the natural conformation of animals.

Finally, they approximate them in their physiological relations, since the nerves, muscles, and all the similar organs in animals and in man, perform similar functions. This proves, still more, the uniformity of the chemical and anatomical relations spoken of.

But it would be useless to deny the great influence which comparative anatomy has had on the improvement of human anatomy, when independently of what we have said, we are permitted to enquire into the essential parts of the organs of man, by the means of the dissection of zoophytes, worms, insects, crustacees, and molluscæ, in which we find their organs conveniently divested of all those accessory parts which envelop, and complicate those of man. It would be in vain to pretend to discover this in the organs of man, hid as they are in the multiplicity of their envelops, and because anatomical instruments are

as yet too imperfect to bring them fully to our view.

Hence, we are enabled, although generally, to determine which are the essential organs of animal life; which are the organs designed for its support and preservation; and which are the accessory organs, that contribute, successively, to render animals of a superior order more complex. This knowledge is, indeed, of immense importance; and the experienced physician should know, how indispensable is the precept in medical practice, to distinguish as much as possible organic diseases, not only by their symptoms, form and nature, but also by the importance or interest which the affected organs possess in the animal economy. For, whatever attacks the organs, which are essential to life, is both dangerous and mortal, which is not the case when the organs of a secondary and third order are deranged.

From these observations, we perceive still more clearly, the reason why it is necessary to pay more attention to diseases that attack the vital organs, such as the nerves and muscles, the exercise of which is the strongest evidence of life; and also to those which affect the stomach, the organ charged with the support of life itself. With the exception of the organic diseases of the lungs, the diseases of this organ (although they

belong to the third order of organs, as the sequel will shew) must be very attentively studied and treated with much judgment and prudence. To be convinced of this, we need only recollect, that this viscus is formed of a cellular structure; that they are continually exposed to the access of the different gasses, and to the sudden changes of atmospheric temperature; that, moreover, they are designed for the exercise of respiration, the object of which is the renovation of the vital qualities of the blood, and from which, the living body, after the concurrence of a series of chemical circumstances, derives its strength, vitality, muscular irritability and preservation. The lungs from these circumstances, become as important in the plan of life as the nervous system and the stomach, which results from the laws which nature has established in the animal economy.

Comparative Anatomy, to which we return from our medical digressions, cannot, it is true, furnish us with the knowledge of the gelatinous substance which appears to us to be the unity of animal organization, after the manner of chemistry, whose object is the analyzation of inorganic bodies, and lifeless animal substances. It has not, I confess, the same advantages; because all the animal organs, in a state of life, are linked together by unalterable relations. To resist these

laws, to separate and decompose them is to deprive animals of life....to be wanting in respect to nature, and to confound them blindly with the mineral mass.

But, deductions made from the influence of chemistry upon dead animal matter, and from the knowledge of earths, salts, phosphorus, carbon, hydrogen, azote, oxygen, sulphur and iron, which, combining in different proportions, produce gelatin, albumen and fibrine, and these again, uniting variously, form the solids and fluids of the animal body, are, notwithstanding, highly interesting. From considerations of this kind, also, we are forcibly led to study and develop the physical elements of organic matter, for, when we are made acquainted with their chemical elements, we have not entered far into the knowledge of man.

As for the rest, I acknowledge the great utility of chemistry, to which medicine and surgery and the fine arts owe many of their useful discoveries. The science of animal chemistry is, nevertheless, as yet in its infancy, however great the improvements made in our days.

Nor is the anatomy of man itself capable of furnishing us with the means which comparative anatomy affords for the improvement of our knowledge relative to the organization of man. For.

who does not know, at the present day, that, that inscrutable link which, in a state of life, unites all the organs and functions towards one object, escapes from the animal body when deprived of life? Do we not behold, as soon as a body is deprived of animation, that it no longer resists the laws which govern dead matterthat the action and character of vitality disappear; and that disorganization seizes on the lifeless mass of animal matter, and brings it to a state in which it no longer differs from a mineral?

After death, the blood, the lymph, the bile, the gastric juice, the synovia, and all the animal humors, bear no analogy to those which exist in the living system; and indeed, it is useless to pretend any longer to very great success attending the dissection of the human body after death, when its organization shall have disappeared, when the solids and fluids shall have changed, and when the carcase itself shall have already entered into the immediate domain of chemistry.

Though the prejudice of wishing to discover the character, form and seat of diseases, by means of the dissection of dead bodies still is in existence, we may nevertheless recur to this source of information, when we wish to discover the cause of organic and local affections, the traces of which still remain a short time after death. Students

may also learn, by the dissection of the dead human body, all its component parts, and their relative situation ; but I do not believe that human anatomy can add much to the mass of information relative to the knowledge of man, since it endeavors to draw from an inanimate source, already exhausted, the inexhaustible phenomena of animated nature.

Thus, it is easy to comprehend why Hiropphilus and Erasistratus, two famous anatomists of antiquity, demanded of their government, permission to dissect (according to some historians) the live bodies of criminals condemned to die, which they obtained ; and why human anatomy made such rapid progress at that day. We are far from wishing to inculcate this kind of inhuman cruelty ; we wish merely to shew how much we may aspire to, in the improvement of our knowledge in regard to the structure of man, by relying, first, on the examination of the first traces of the nervous and muscular fibres, which are the physical instruments of sensibility and irritability, with a view of following, step by step, the progress which they make from the radiarii to man, and thus to explore the nervous and muscular systems which result from them. Secondly, on the study of the organs of animals, beginning from the first sketches which we find in animals with-

out vertebrae, up to the perfection which they have acquired in fishes, reptiles and birds, and still more in the mammiferae; and this will enable us to distinguish their essential parts from the successive and auxiliary envelops which enfold them in man. Thirdly; on the comparison of nervous, muscular and cellular systems, and the organs of animals with the similar systems and organs in man, in order to draw from the varieties, analogies and differences which may be noticed, facts and observations calculated to promote the advancement of human anatomy and physiology. Fourthly; on repeated dissections, either of new kinds of animals, in order to study the modifications of their organs, or of known ones, to verify and realize general facts, or finally of those smaller kinds of animals, which often survive dissection, such as the polypi, and which affords us an opportunity of consulting living nature.

This, we presume, is the most effectual mode of investigation, in order that we may arrive at the object of our researches. For I am still of opinion, that Aselli derived his knowledge of the lymphatic vessels from Erasistratus, who first discovered some traces of white vessels in the mesentery of young goats: and Mascagni, a great Italian anatomist, most certainly could not of

himself been able to embellish and improve the theory of the lymphatic system, if he had not made reiterated and successful experiments on various kinds of animals. From all these circumstances, I conclude, that the study of Comparative Anatomy, which has already removed many prejudices in medicine, and which has greatly improved Human Anatomy and Physiology, tends, in an especial manner, to further the improvement of the healing art.....*quod erat probandum.*

COMPARATIVE PHYSIOLOGY.

I do not believe, on the other hand, that human Physiology can, of itself, correct the defects of its own imperfections ; that it is capable, by its own efforts, to remove the obstacles, and smooth the difficulties which embarrass the physiologist, without the assistance of Comparative Physiology, which has the object to make known to us the type, mechanism and order of the laws which govern life ; to point out to us the most striking phenomena that nature has multiplied in all the animal systems, and to open a boundless field for our researches ; to offer to us the most instructive facts, by comparing the functions of different animals with those of the same kind in man. This is, properly, the object of Comparative Physiology ; To learn, from the analogies, varieties and differences which are observable in them, the knowledge in relation to the progress of the animal economy ; to impose on us the necessity to class the functions of life in a new way ; and, in fine, all these favorable circumstances flatter and induce us to follow constantly the guide which Nature has given to us, in the study of Com-

parative Physiology, for the improvement of our knowledge in medicine.

Galen, who established *Dogmatism*, with a view to cause himself to be considered next to Hippocrates, the Father of Medicine; who strictly followed the philosophy of Aristotle and the practice of the Old Man of Coz; Galen, I say, was, if I am not mistaken, the first who hinted the utility of Comparative Physiology. This idea I take from his work, *De usu partium*.

Therefore, medical historians relate, that Galen, according to his own report, was obliged to repair to Alexandria, where he was permitted to prepare the bones of the human skeleton, and to study their texture, form, solidity and properties. This, then, was in opposition to the prejudices which existed at Rome, where an express act prohibited even this extension. In this state of affairs, Galen perceived the necessity of dissecting some kinds of animals, and, particularly APES, which approach nearer to the structure and form of man than any other animal.

This anatomical procedure insensibly led him to some curious, and, at the same time, useful discoveries, relative to the structure of the organs of animals, and to the functions for which they are designed. At this present period, I know, that this ancient deposit of knowledge is, truly,

without reason, neglected....I say, without reason, since we find, that in it, just observations may have a tendency to enlighten us, and explain the benefit of things which may, perhaps, be widely diffused.

Nevertheless, it must be acknowledged, that none of the ancient physiologists could shew us the first lines of the Science of Physiology. This glory is justly due to Dr. HALLER. This philosopher of nature, after rescuing human physiology from the superstitious theories of *Pythagoras*, from the reveries of *Carthusius*, from the mathematics of *Borelli* and *Bellini* his disciple, from the psycologic doctrine of *Stahl*, from the natural philosophy of *Boerhaave*, from the chemistry of *Wan Helmont*....Haller, I say, after having reformed human physiology by giving it a scientific aspect, united to the discoveries of his predecessors, IRRITABILITY; and was, consequently, considered the most eminent man of his day, in relation to the physical knowledge of man.

In the mean time, it is known that the whole of all these physiological discoveries cannot be organized into a **Body of Doctrine**, since the analytical method of the great philosopher Bacon has been employed, to the success of which the pro-

gress, that the natural and abstract sciences have made since that period, is indebted.

But, after all this progress, in a succession of several ages, and of long vigils of zealous physicians and physiologists, can we conclude, without falling into error, that human physiology has already arrived at its highest degree of perfection? No ; but it may certainly approximate thereto with the assistance of comparative physiology.

A demonstrative proof that the study of this science has an influence on the improvement and progress of which the knowledge of man is yet capable, is, that in following the outlines of Nature, in treading in her steps, and in studying her laws, in the examination of the different functions of all animals yet known, we can, in the first place, be enabled to determine, in a certain degree, what are the vital functions properly so called ; to wit, those which give birth to the exercise of animal life : what are the auxiliary functions, *i. e.* those which can be dispensed with in certain animals, or be entirely wanting in others, without the least danger to their existence : and what are the functions which alone concern the propagation of the different species of animals.

From these researches we come, secondly, to class, according to the type of Nature and without

trouble, the numerous functions of man : thirdly, to lay hold of the general object of the functions themselves ; and, fourthly, to direct the influence of their knowledge on the progress of the medical art.

First.... To determine what are the vital functions, *i. e.* those alone which are sufficient for the existence of animal life, we must bear in mind that the *Infusores* have no special organ, and are, at the same time, affected by the action of heat, of light, and of the atmosphere ; since they exhibit continued and striking motion in their own element. This proves, that the life of the Infusores consists, simply, in the exercise of sensibility and irritability, which determine feeling and motion, for it would be useless to seek, in them, for digestion, respiration, circulation and all the other functions, because they have neither stomach, heart, arteries, veins, lungs, nor any other special organ.

But what is most important to know in this respect is, that sensibility and irritability are found in all living animals without exception : they are more articulated in beings in which life possesses more energy : they announce to us, by their action, the existence of the polypus which dwells in the cell, notwithstanding the appearance of a gelatinous substance deprived of life, and it

only disappears when the animal perishes. This evidently demonstrates, that sensibility and irritability, conjunctly operating, are the only vital functions.

For this display or exuberance of the functions, which, in truth, play a great part in the economy of the *mammiferæ*, serves only to answer the intentions of Nature, which designed to multiply the means of preservation in the most complex animals in such a manner, that if the existence of man, who is the *chef-d'œuvre* of creation, could be only momentary, sensibility and irritability alone would be sufficient to cause him to exist.

Thence it follows, that digestion, respiration, circulation, and all the other functions which depend on them, are auxiliaries to the existence of animals ; and we must ascribe them rather to the order in which Nature has placed them. We find them, in fact, among the functions which Nature herself has destined for the support of life in the most complex animals. It is an error then, that they always have been placed in the rank of the vital functions.

And they are, in a still greater degree, auxiliaries, because digestion, which is scarcely delineated in the numerous family of *Polypi*, in which respiration and circulation do not even exist, and

they, nevertheless, enjoy life as well as the most complex animals. Then, we must look for respiration in the *radiarii*, and circulation in the *crustacees*; and again, they are only sketched in all animals without *vertebræ*.

It is only, by the aid, then, of Comparative Physiology, that we can draw, from the original plan of Nature, an exemplification of the distribution of the functions of man in three classes.* The first contains the vital functions, such as *sensibility* and *irritability* set in action; the second, the auxiliary functions, such as *digestion*, *respiration* and *circulation*, &c. and the third, to the exercise of which is attached either the generation or production of animated beings.

It results, that, considered in a general point of view, all the objects of the functions, or all the interests which they take in the exercise of animal life, are reduced to three. The first relates to the vital functions, the object of which does not differ from that of the AUTHOR who designed to create living beings, *imperio voluntatis*, to give probably to mankind a striking example of his power; and it is, I repeat, the design of the vital functions, which are as important as *life* itself which represents them. The second is that of

* This new distribution will be explained in the first volume.

the auxiliary functions to which nature has confided the concern of bedewing, reviving and supporting the vital functions in a state of activity and vigor ; I would say, the exercise of *sensibility* and *irritability*, the object for which *digestion*, *respiration* and *circulation* perfectly answer, the energy of which is but the effect of the influence of sensibility and irritability, which re-act, in an admirable order, on them to support them, in their turn, in a state of energy. *Consensus unus, consentientia omnia*. Finally, the exercise of life in a length of time brings life itself to its close. But, ere plants and animals, which enjoy life, pay their tribute to nature, they second the inclination which leads them to reproduce what resembles and succeeds them, for the continuation of living beings which replace each other. *Corruptio unius, generatio alterius*. This is the third object which nature has confided to the organs of generation and production. You, *Materialists* ! do you not see, in this magnificent picture of living Nature, the infinite power and the image of a *Creative Being* ? Can this great work be, without a sufficient reason, the effect either of *chance* or of a *chimerical cause* ? The man who attempts to inculcate such sentiments must be actuated by a sense of innate depravity, and, probably, by remorse of conscience for crimes committed !

But, properly speaking, this is not the object of our researches. It is rather the line of demar-

eation between the vital and the auxiliary functions which we seek, to place in affinity with the principles of medical practice. This Physiological remark may, in effect, guide us in the treatment of general diseases, which more particularly affect either the vital or the auxiliary functions. It enables us to declare, explicitly, our conjectures on the result. It explains the cause of the dangerous consequences of Apoplexy, Yellow and Typhus Fevers, which attack *sensibility* and *irritability* in which life is seated. It enables, to class the diseases of the stomach, liver, spleen and pancreas, in a different order; and, at last, it may direct us in the choice of the most proper remedies and quantity which may be given.

This dissertation gives but a general idea of what further improvements the medical art is susceptible, with the aid of Anatomy and Comparative Physiology: and it is only by the study of these new sciences, that physiologists have (and but lately) succeeded in determining, with probability, the pre-existence of germs in the ovary of the female kind....I say, with probability; because the females of frogs contain germs in their ovaries, which can clearly be distinguished therein, before any fecundation whatever. And it is, by this method of arriving at facts, that human physiology is happily divested of a multitude of

chimerical ideas and prejudices concerning generation....errors which have vanished by the study of the organization of animals.

Moreover, it would be desirable, for the benefit of human Physiology, that the physiologists of the present day would direct their attention towards the dissection of the *hydras*, in order to examine the mechanical character of the human stomach ; because these small animals disclose, through their intestinal paunch, a kind of agitation of the food which propels and repels itself by a kind of peristaltic motion. Observations of this tendency would greatly improve the doctrine of the knowledge of man.

These are the general principles of Anatomy and Comparative Physiology, which I consider to bear a close affinity to the late improvements in medical science. In my apprehension, they amply merit the rank assigned them in the groundwork of the pyramid discovered by the philosopher BACON....a pyramid, whose summit disappears in the very midst of the clouds in which Metaphysics are seated ; and displays its empire whilst Mathematics and the Natural Sciences are always spreading new light on the horizon of a country, among whose virtuous population may be distinguished the friends of truth and the patrons of science.

My own experience enables me to declare that I have succeeded in the classification of mineral, vegetable and animal medicines on a new plan*, which has been favorably received in Europe ; and to determine a basis for PATHOLOGY†, perhaps better adapted, than any now extant, to the laws which govern *Life*. I certainly am indebted to my own perseverance, for success in the studies of those new branches of Medical Science, Comparative Anatomy and Comparative Physiology. These have led me to the discovery of a valuable *tonic*, called the VITAL ELIXIR, now generally known in Europe, and introduced into America with success, the active operation of which has proved, by long experience, that the object for which it was intended has been fully accomplished.

Finally, to obtain a view of the lights I deduced from these sciences, I recommend a cursory perusal of my following works :

Recherches sur la prolongation de la vie humaine ; 1 vol. 8vo. printed at Paris, 1812.

Also ; Rapporti sul metodo economico medico da praticarsi negli ospedali : 1 vol. folio. Naples, 1814.

* Vide, L'appendice ovvero supplimento all' opera col titolo : *Nuovi Elementi di Materia Medica* ; by Julius Ruco, 2 vol. Naples, 1805.

† Vide, Lo Spirito dell' Arte Sfigmica, 1 vol. 8vo. Naples, 1810.

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